

Tropical Winds

The Official Newsletter of NWS Miami



Virginia Gardens Vegetation – David Ross

Welcome to another issue of Tropical Winds. We will begin discussing what occurred during the 2013-2014 Dry Season. After that, we will discuss one of the most significant weather events South Florida experienced so far this year: the historical Palm Beach flooding of January 9/10th. The 2014 Hurricane season outlook and an introduction to aviation forecasting will follow. Happy reading!

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Weather Review and Outlook



By: David Ross

Sun Halo – Evelyn Rivera

Looking Back at the Dry Season ***November 2013 – May 2014***

With the summertime regime of daily thunderstorms making its way back to South Florida, here's a quick recap of the dry season. Since the wet season began May 26th, a little later than the median date of the 20th, data for the month of May has also been included.

Rainfall highlights for the past dry season:

Fort Lauderdale experienced its 2nd wettest November through May period on record at the Fort Lauderdale-Hollywood International Airport (1998 to present), but fell outside the 'Top 10' wettest periods for the Fort Lauderdale area climate record. The Wettest on record was November 1958 to May 1959, when 39.64 inches of rainfall was recorded.

Wettest day for South Florida – January 9/10th – As seen in the rainfall table below, numerous observation sites throughout Palm Beach County recorded rainfall in excess of 12 inches in roughly 4 hours. The Hypoluxo area received rainfall totals exceeding 22 inches, making it rarer than a 1000-year event!

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NATIONAL WEATHER SERVICE MIAMI FL
1155 AM EST FRI JAN 10 2014

...PUBLIC INFORMATION STATEMENT...

*****STORM TOTAL RAINFALL*****

LOCATION                STORM TOTAL    TIME/DATE    COMMENTS
                        RAINFALL
                        /INCHES/      OF
                                      MEASUREMENT

FLORIDA

...PALM BEACH COUNTY...
1 WSW HYPOLUXO        22.21    800 AM  1/10    MESONET
1 SW PALM BEACH        16.03    800 AM  1/10    MESONET
LANTANA                15.04    800 AM  1/10    MESONET
1 ESE LANTANA          14.79    700 AM  1/10    COCORAHS
BOYNTON BEACH          13.13    800 AM  1/10    MESONET
1 E LANTANA            12.46    800 AM  1/10    MESONET
2 NW BOYNTON BEACH    11.00    800 AM  1/10    COCORAHS
PALM BEACH             10.75    800 AM  1/10    MESONET

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Figure 1.1 - Snippet of a Public Information Statement issued by NWS Miami on January 10th 2014, depicting 24-hour rainfall totals from South Florida observation sites.

Wettest month for South Florida observation sites – January (no surprise!) Our Cooperative Observation (COOP) site in Juno Beach recorded 15.13 inches of rainfall throughout the month of January. By the end of January, three other sites received over five inches of rain. Normal rainfall for January across South Florida is generally on the order of one to five inches.

Driest month for South Florida observation sites – December – Our COOP site about 15 miles south of South Bay recorded no measurable rainfall throughout the month. By the end of December, ten other sites received less than a half-inch of rain. Normal rainfall for December across South Florida is generally on the order of one to two inches for western and central areas, and two to four inches for eastern areas.

The following graphics depict the observed rainfall totals for November through May, in blue, and the departure/difference from normal in yellow.

OBSERVED vs DEPARTURE FROM NORMAL RAINFALL
(November 1, 2013 - May 31, 2014)

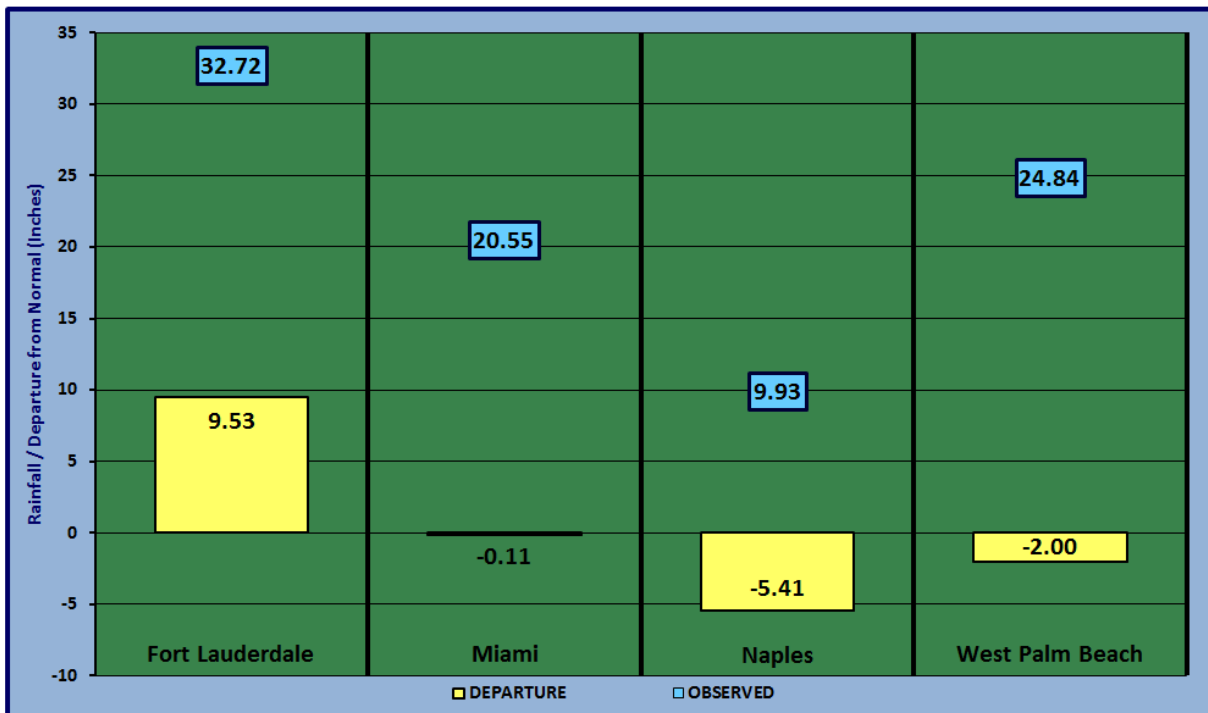


Figure 1.2 - Observed versus departure from normal rainfall for South Florida climate locations.

OBSERVED vs DEPARTURE FROM NORMAL RAINFALL
(November 1, 2013 - May 31, 2014)

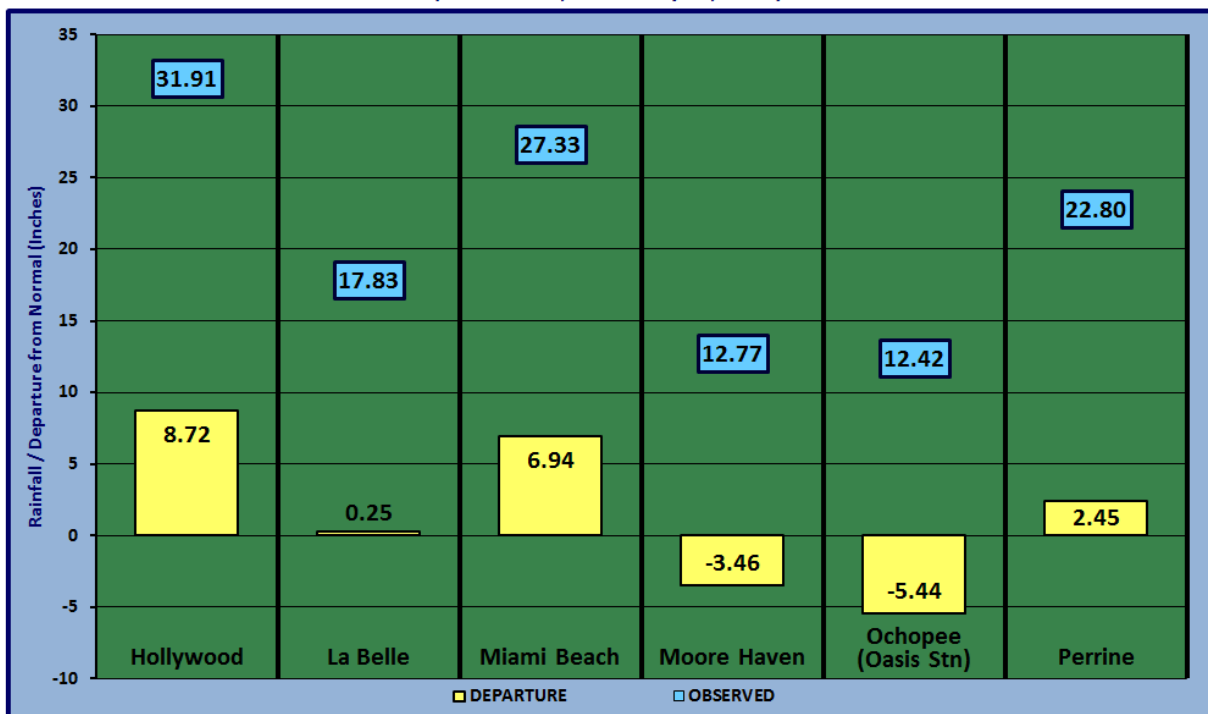


Figure 1.3 - Observed versus departure from normal rainfall for select South Florida COOP sites.

Average monthly temperatures, at South Florida's four main climate sites, ranged from 2.5 degrees Fahrenheit below normal (Fort Lauderdale, January) to 6.3 degrees above normal (West Palm Beach, December). January was the odd-man-out as a cooler than normal month sandwiched between two significantly warmer than normal months. Most of the cooler January temperatures occurred in the second half of the month, ushered in by a series of strong cold fronts.

Seven-month averages were on the warmer side, ranging from 0.8 degrees above normal (Fort Lauderdale) to 2.6 degrees above normal (West Palm Beach). These averages were warm enough to make for some of the warmest November through May periods on record.

Temperature highlights for the 2013-2014 dry season:

Naples

WARMEST November through May period on record

Previous record was 2011-2012 & 2007-2008, 72.0°F

Highest temperature: 94°F; May 8th, May 13th

Lowest temperature: 38°F; January 19th, January 23rd

Fort Lauderdale

2nd warmest November through May period on record

Warmest on record was 2007-2008, 75.1°F

Highest temperature: 92°F; April 8th

Lowest temperature: 43°F; January 17th, January 19th

Miami

2nd warmest November through May period on record

Warmest on record was 2007-2008, 75.3°F

Highest temperature: 92°F; May 23rd

Lowest temperature: 46°F; January 17th, January 19th

West Palm Beach

2nd warmest November through May period on record

Warmest on record was 1948-1949, 74.1°F

Highest temperature: 92°F; April 8th, May 23rd, May 24th

Lowest temperature: 38°F; January 23rd

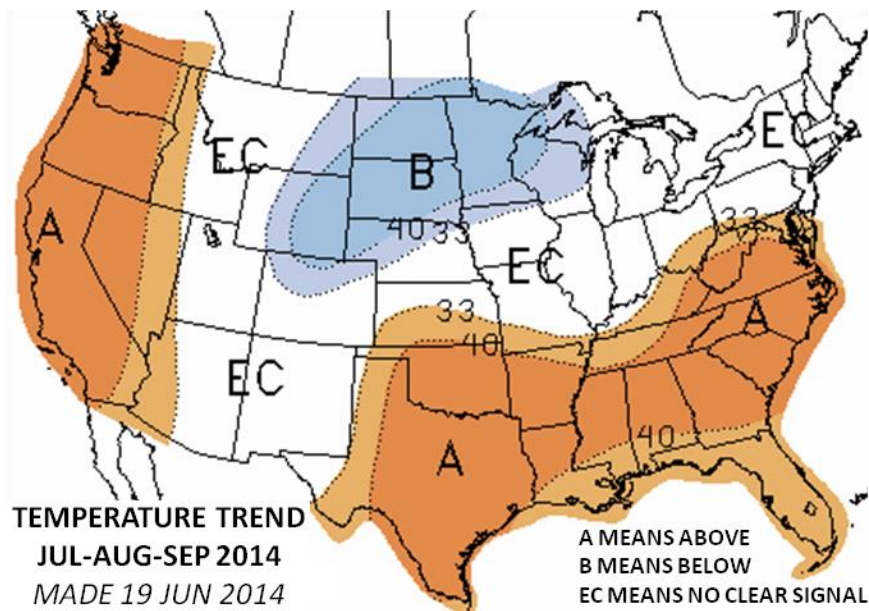
**Average Monthly Temperature (degrees Fahrenheit) & Departure from Normal
(November 1, 2013 – May 31, 2014)**

	Fort Lauderdale		Miami		Naples		West Palm Beach	
	Avg.	Dep.	Avg.	Dep.	Avg.	Dep.	Avg.	Dep.
Nov. '13	75.4	-0.1	77.1	+2.2	74.6	+2.5	76.4	+3.6
Dec. '13	74.0	+3.0	75.1	+4.6	72.4	+5.6	74.4	+6.3
Jan. '14	66.5	-2.5	67.9	-0.3	63.9	-0.6	65.5	-0.2
Feb. '14	73.9	+3.0	74.2	+4.0	70.6	+3.7	72.3	+4.5
Mar. '14	73.5	+0.6	73.7	+1.1	69.6	-0.4	71.1	+0.6
Apr. '14	77.9	+1.7	77.5	+1.7	74.8	+1.5	76.2	+2.4
May '14	80.4	+0.2	80.6	+0.7	79.5	+1.3	79.6	+1.2
7-Month	74.5	+0.8	75.2	+2.0	72.2	+1.9	73.6	+2.6

Table 1.1 - Monthly and 7-month average temperature and departure from normal at the Fort Lauderdale, Miami, Naples, and Palm Beach Airports.

July through September Outlook

The Climate Prediction Center's 3-month forecast depicts a trend for above average temperatures across the southeast United States, but doesn't have a clear indication on the potential precipitation trend for South Florida.



Courtesy of the Climate Prediction Center

Severe Weather

By: Chris Duke, Chuck Caracozza and
Evelyn Rivera-Acevedo



Palm Beach Flooding – Kenneth Klaus

Historic Palm Beach Flooding January 9-10 2014

For additional details visit: http://www.srh.noaa.gov/mfl/?n=palm_beach_flood_010914

During the night of Thursday, January 9, 2014, several meteorological factors combined to produce torrential rainfall across portions of coastal Palm Beach County over a rather short period of time. From roughly 8pm until midnight, several locations received over 12 inches of rain Thursday evening with one mesonet site just west-southwest of Hypoluxo receiving an astonishing 22.21 inches during the same time frame. Steady rain rates were on the order of 3-5 inches per hour. Figure 2.1 below shows a plot of the observed rain amounts (black dots) against curves of rain depth versus duration for different return periods or recurrence intervals. As you can see, for the period of 1.5 to

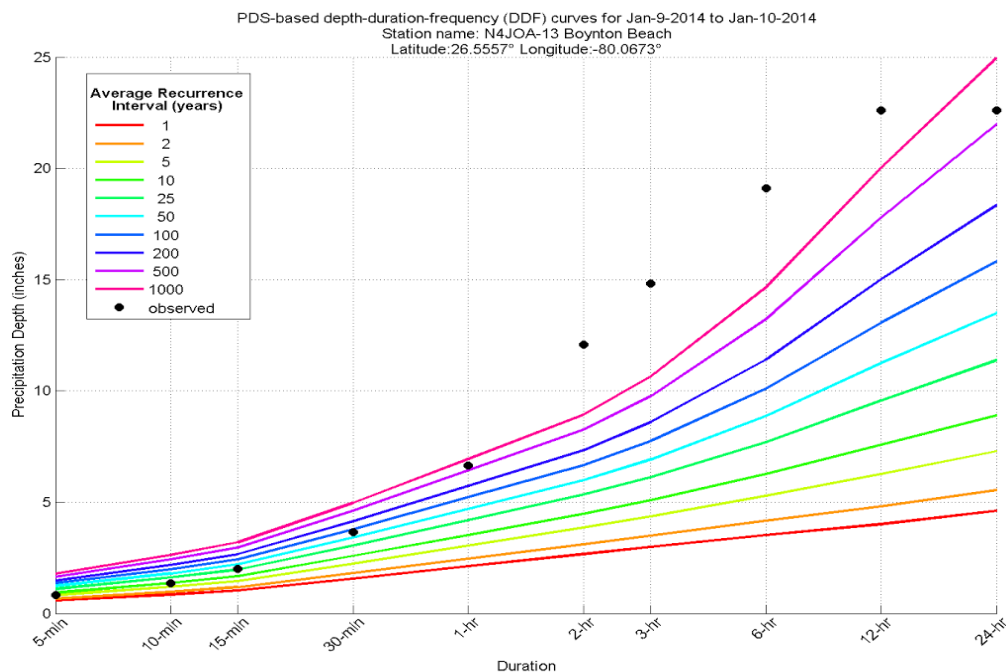


Figure 2.1 - Observed rain amounts (black dots) as a function of duration (hours) against curves depicting the same for different return periods for the location. Courtesy of the National Weather Service (NWS) Office of Hydrology.

around 18 hours, the observed rainfall amounts in this event exceeded the 1000 year return period, truly staggering.

These staggering rain rates led to severe flooding overnight and through Friday, January 10th well after the rain had stopped. This prompted the South Florida Water Management District to hold an impromptu weather briefing Friday afternoon to discuss the safest and most efficient ways of moving water out of low lying areas and into the regional flood control system. The most severely affected communities were Delray Beach, Boynton Beach, and Lantana. Severe flooding of neighborhoods led to the closing of numerous roadways, including all lanes of Interstate 95 in Boynton Beach. Several lakes and canals overflowed their banks. Flood waters entered a number of homes and businesses, but no major structural flooding was noted. All Palm Beach County schools were also closed due to the flooding. Tragically, two people perished as a result of this historic event. A 56 year old woman drowned in Delray Beach after she drove her car off of a flooded roadway and into a lake. Also in Delray Beach, a 90 year old man drowned after slipping into a canal while walking down a street. Rainfall totals of 8 to 10 inches were also experienced as far west as the Florida Turnpike in Palm Beach County (see Figure 2.2 below).

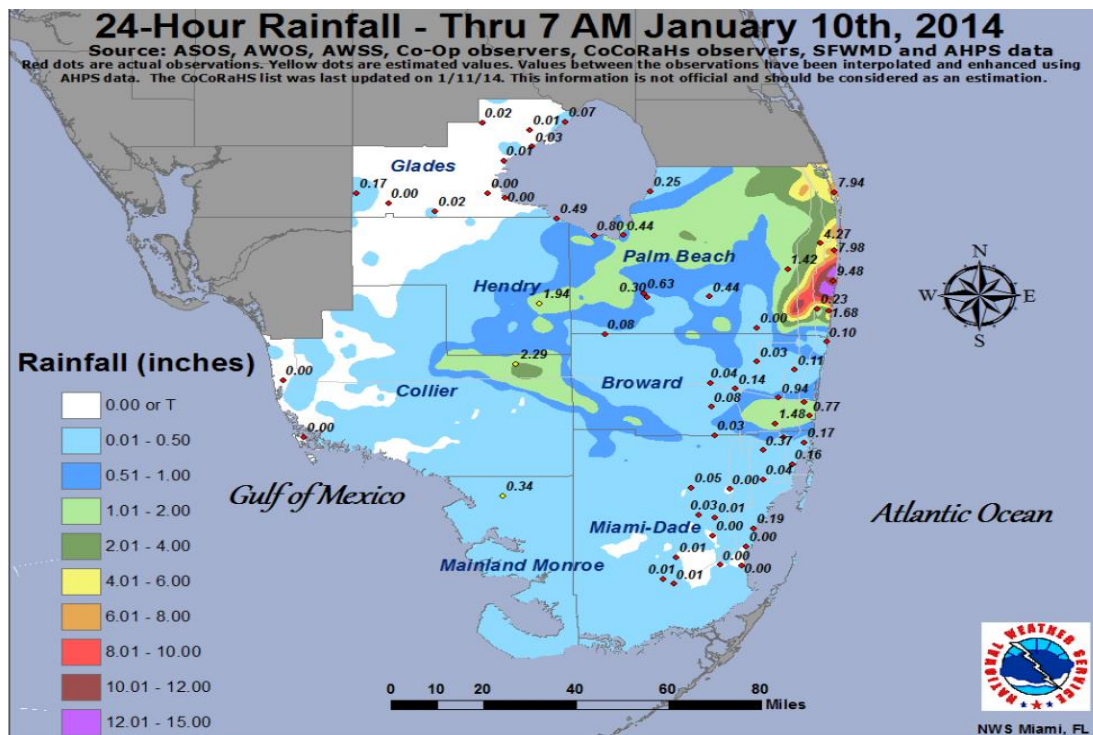


Figure 2.2 - 24-hour rainfall total map ending at 7am on January 10th, 2014.

Chuck Caracozza was one of the forecasters working during this event. Here is how he described his experience:

“I was on the warning desk during the evening of January 9th as the rainfall event was evolving. We were expecting showers through the evening hours as there was plenty of moisture available as well as a stalled frontal boundary in the area. As the events started to unfold, we began to receive phone calls about roadways flooded. This was when I issued the urban flood advisory. As the rainfall continued to get heavier and the showers were nearly stationary, we began to receive reports about more serious flooding. At this point, the urban flood advisory was upgraded to a flash flood warning. As the heavy showers pushed farther to the south, the flash flood warning was extended south as well due to the heavy rain continuing over the same areas for a prolonged period of time. Working the radar during this event was truly a learning experience with flooding events in South Florida. This event was an extremely rare one and the lessons I have learned from it I will carry throughout my career with the National Weather Service.”

Since flooding continued into the morning of January 10th, but the rain had ended, flood warnings were necessary for NE Palm Beach County (issued at 3:29 AM) and SE Palm Beach County (issued at 6:27 AM). The flood warning for NE Palm Beach County was allowed to expire during the morning as the flood waters subsided. Since SE Palm Beach County had the brunt of the excessive rainfall, flooding continued not only through the day but even during the early morning hours of January 11th, so the flood warning remained in effect through mid-morning.

So now the question is: what was the cause of this weather? Several meteorological factors came together to produce this rare and historic flood event. A stalled frontal boundary across South Florida edged to the north through the evening of January 9th. As it did, it placed South Florida in a moisture rich environment, with a precipitable water amount of 1.82 inches (as depicted in the morning's upper air sounding). This amount was near the January record of 1.98 inches spanning the last 65 years, placing it in the 99th percentile of roughly 4000 observations taken in January since 1948. At the same time, a low pressure system was slowly tracking to the south across the St. Lucie and Martin county coasts producing heavy rainfall in these areas. As this

low moved to the south into Palm Beach County, the storm motion slowed down and eventually became nearly stationary across extreme southeastern Palm Beach County. Heavy rainfall then became enhanced as it encountered convergent flow along the coastline.

Hurricane Season 2014



By: Dan Gregoria

Hurricane Sandy from Space

Major Hurricanes and South Florida

Major hurricanes (Category 3 or higher) are no stranger to South Florida. Since 1966, there have been a total of 4 major hurricane landfalls on the Florida peninsula (Fig. 3.1). However, in the 45-year period prior (1920-1965/ Fig 3.2), 15 major hurricanes made landfall onto the Florida peninsula – almost 4 times the amount during our recent 40+ years! Will history repeat itself? No one can say for sure, but history indeed tells us that we *could* be dealing with more major hurricane landfalls in the future. Whether it's as frequent as the active decade of the 1940s or as infrequent as recent years, more major hurricane landfalls are just a matter of time.

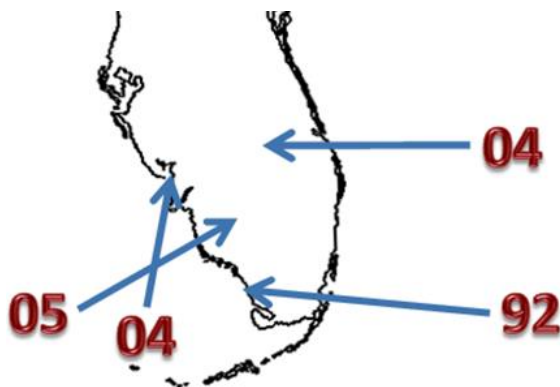


Figure 3.1 - Major Hurricanes 1966-Present

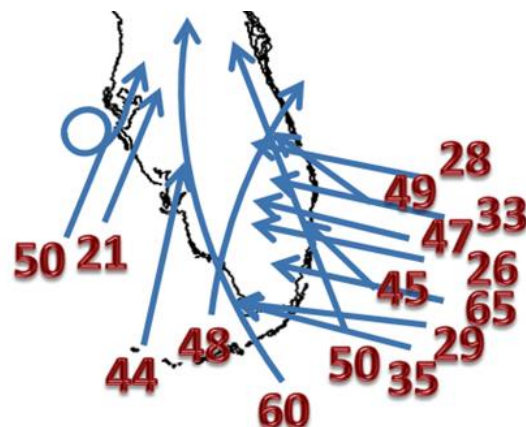


Figure 3.2 - Major Hurricanes 1920-1965

The last major hurricane to make landfall in South Florida (or anywhere in the United States for that matter) was Hurricane Wilma in October of 2005. Wilma was a Category 3 hurricane as it made landfall at Cape Romano on the SW Florida coast, then moved across SE Florida as a Category 1-2 hurricane.

Official Forecast for the 2014 Atlantic Hurricane Season

The NOAA forecast for the 2014 Atlantic Hurricane Season predicts a high probability of a near or below normal hurricane season. Figure 3.3 below details the 2014 forecast. Compare this against the averages - 12 named storms, 6 hurricanes, and 3 major hurricanes – and one can see that this season is expected to be near to below normal.

The main factor leading to this inactive forecast is the expectation of El Niño developing, which tends to increase wind shear across the Atlantic, leading to less development.

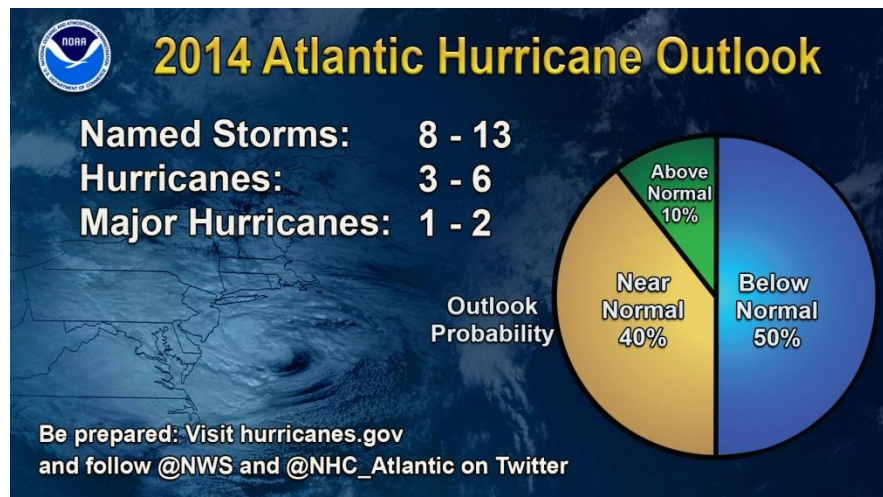


Figure 3.3 – NOAA's 2014 Atlantic Hurricane Season Outlook

What Does The Seasonal Hurricane Forecast Mean for South Florida?

A below normal seasonal forecast does not equate to letting your guard down. Hurricanes hit during inactive years, sometimes major hurricanes. The poster child example of this is 1992, which had a well below average/inactive hurricane season, Hurricane Andrew produced catastrophic damage across

south Miami-Dade. Therefore, do not let the forecast provide you with a false sense of security.

Be Prepared Every Season

South Florida has seen the highest frequency of hurricane strikes in the United States, so it is imperative that everyone be prepared each and every hurricane season. Each person should have supplies on hand to last at least 3 days. For information on developing a hurricane preparedness plan and kit, visit www.ready.gov. Preparedness begins with you!

Aviation Forecasting

By Kim Brabander



Air Force One – David Ross

Weather forecasting at the local Forecast Offices around the country and the world also include “point” forecasts, or a short-term prediction of the weather conditions surrounding a specific location. One of these points is an airport. The Miami Forecast Office issues 24-hour forecasts for seven major airports across South Florida, updated four times daily. These include Palm Beach International, Fort Lauderdale Executive, Fort Lauderdale/Hollywood International, Opa-Locka Executive, Miami International, Kendall-Tamiami Executive, and Naples Municipal Airports.

These forecasts include surface wind direction and speed, visibility, significant weather and sky conditions. Wind direction is one of the most important weather elements, if not the most important, an airport tower controller and pilot needs to know. In take-off preparation, an aircraft must head into the wind for maximum lift. As the aircraft accelerates down the runway, the wind flowing over the wings creates lower pressure above the wing and acts as a lifting mechanism. As this occurs, the pilot points the nose up and off it goes. The pilot must also be aware of surrounding weather conditions such as thunderstorms that may be creating rapidly changing shifts of wind direction and/or speeds on the runway along with low visibility or cloud

conditions. The air traffic controllers also need to be aware of these changing weather elements for safe aircraft separation along with the affects that it may have on departures and arrivals. These forecasts become extremely crucial during severe weather, such as tropical systems.

Forecasts of weather conditions for aviators are not limited to surface elements. The Aviation Weather Center (AWC) in Kansas City, Missouri is responsible for issuing national wind forecasts aloft along with areas of expected turbulence and aircraft icing. Forecasters will alert pilots of all hazards along the air route including thunderstorms, whether the conditions are intensifying or weakening and where they are forecast to move. The winds aloft are very important to the aircraft. A strong head wind for example will mean extra fuel and time to reach the desired destination, possibly delaying the flight. A National Weather Service (NWS) meteorologist is also staffed at 21 Air Route Traffic Control Centers across the United States that provides forecasts to controllers in order to help navigate aircraft around any dangerous flying conditions.

The NWS works very closely with the Federal Aviation Administration (FAA) in providing forecasts for a safe and efficient air traffic control system. NWS forecasts are a vital tool towards the FAA in reaching this goal and why these are updated multiple times during the day.

Changes at the WFO



Sunrise at Miami Beach – Alex Gibbs

We welcome to our office new lead forecaster Kris Mattarochia. He comes to us from the NWS Blacksburg, VA office where he has been a forecaster since 2007. At Blacksburg, Kris led the coordination and teaching of an operational forecasting course at Virginia Tech, led table top exercises with partners, served as lead in the office NOAA Weather Radio Committee, was a lead in the office Enhanced Short Term Forecast Team, and was a member of the Verification and Decision Support Teams. Kris also spent a couple of years at

the NWS Charleston office and before that in the private sector where he also had media experience.

Welcome to Miami, Kris!

*Thanks for
Reading!*



Rainbow over Doral – Dan Gregoria

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